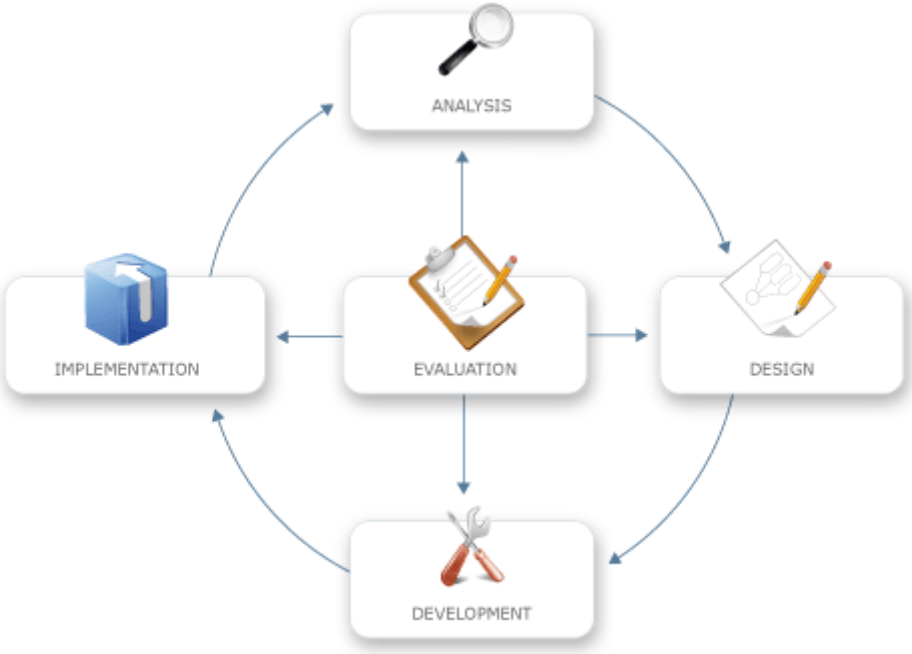
Designing for Distance Learning

As a multimedia developer and instructional designer working primarily on distance learning courses, my role centres on the effective translation of face to face teaching for online delivery.

I work closely with lecturers and other subject matter experts to help them find engaging and innovative ways of presenting their teaching using a medium with which they are perhaps unfamiliar.

Through many years of experience I have developed a framework for the efficient transition of materials into e-learning courseware. Loosely aligned with the ADDIE model of Instructional Design, the process follows a clear cycle of

- needs analysis,
- curriculum and course design,
- multimedia development,
- implementation and
- evaluation.



I often find that materials created for web-based courses are later reused by lecturers and institutions in order to enrich existing face to face modules. This emergence of blended learning strategies into mainstream education is a great testament to the power of online activities to enrich the student experience. They allow learners to approach their learning from many different perspectives, as well as in their own time, and enhance the transfer of skills and knowledge by meeting the needs of students with different learning styles.

Requirements for a successful distance learning course

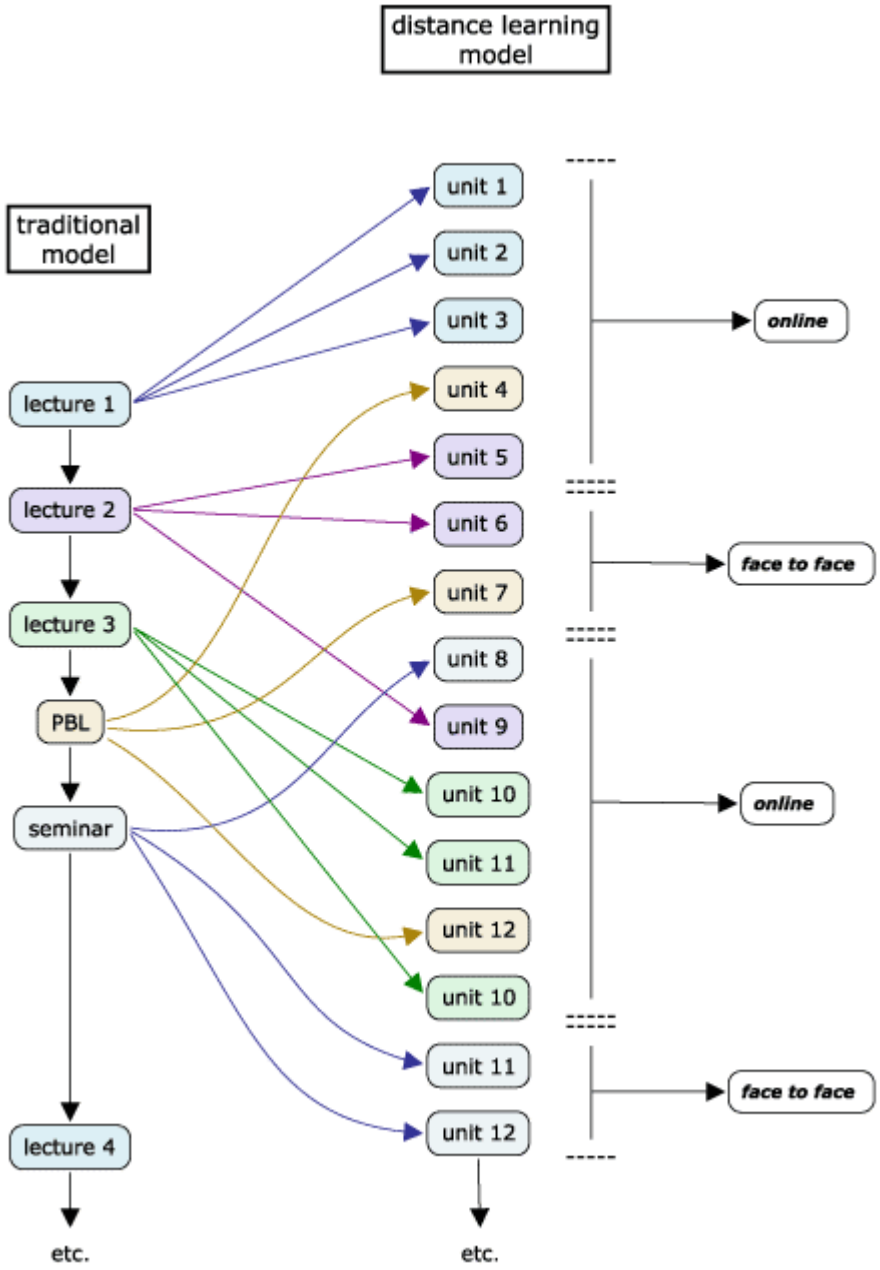
- Strong structure, small modular units of learning
- Clear goal setting
- Frequent questioning
- Practice exercise immediately after a new concept

- Evaluation, feedback, corrective instruction
- Great clarity about nature and scope of assessments and task
- Precise and realistic delineation of time and effort requirements of each unit
- consistency / uniformity across modules

In a distance learning setting, students have a much greater need for a strong framework providing them with a clear path through their learning. Short, chunked learning episodes are key to helping the learner pace their study. These also encourage and motivate the learner by allowing them to feel that they are steadily piecing together their knowledge of the subject.

Transition to a distance model

In keeping with these best practice requirements, the process of translating materials for online delivery involves the 'chunking' of traditional learning episodes, whether lectures or seminars, into units of learning that can be delivered in smaller more manageable chunks - both online or in a blended learning setting.



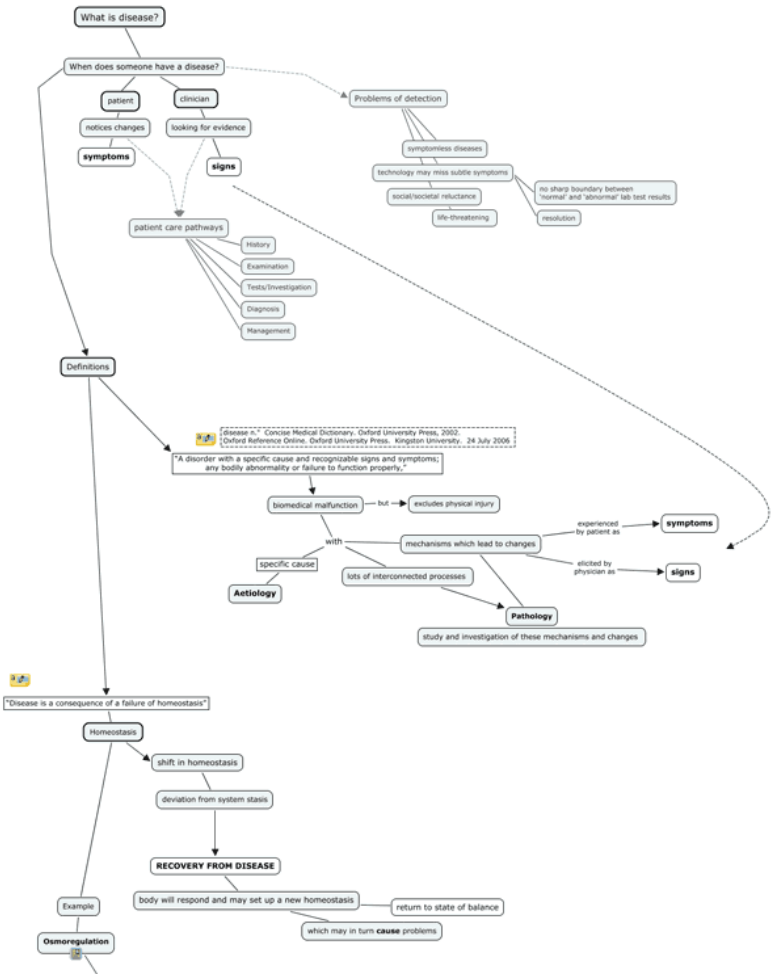
These units can take many forms, ranging from transmissive e-delivery (perhaps what would most commonly be thought of as typical 'learning objects') to collaborative peer-learning activities. Choosing which types of activities are most suitable; whether self-paced, self-guided online activities or interactive case studies, perhaps even software simulations and video SBLs, requires a thorough understanding of the knowledge domain to be taught. To help capture this as a model that can easily be evaluated for chunking, I have devised a process of mapping both the curriculum's learning objectives as well as the path the learner travels through in order to arrive at clearly defined learning outcomes.

The Mapping Process

An online course is more than just a set of PowerPoint slides uploaded to a VLE. Much of the teaching that occurs in a lecture theatre isn't merely derived from those bullet points projected on the screen. In fact, real learning only really blossoms during the discussions and interactions that take place between all of the participants in the room. A key part of my work is to debrief the lecturers and to find out what it is that they teach, and how. This goes beyond the module descriptions that list often non-specific learning objectives and learning outcomes.

Before thinking about multimedia content, I start by carrying out a rigorous mapping process that aims to clarify the information architecture and interaction design of a course or module.

In the same way that a website's site map offers a visual representation of the site's content (and additionally displays navigation flow through the site) I create a set of Development Maps that act as a visual representation of the content and structure of the proposed learning materials.



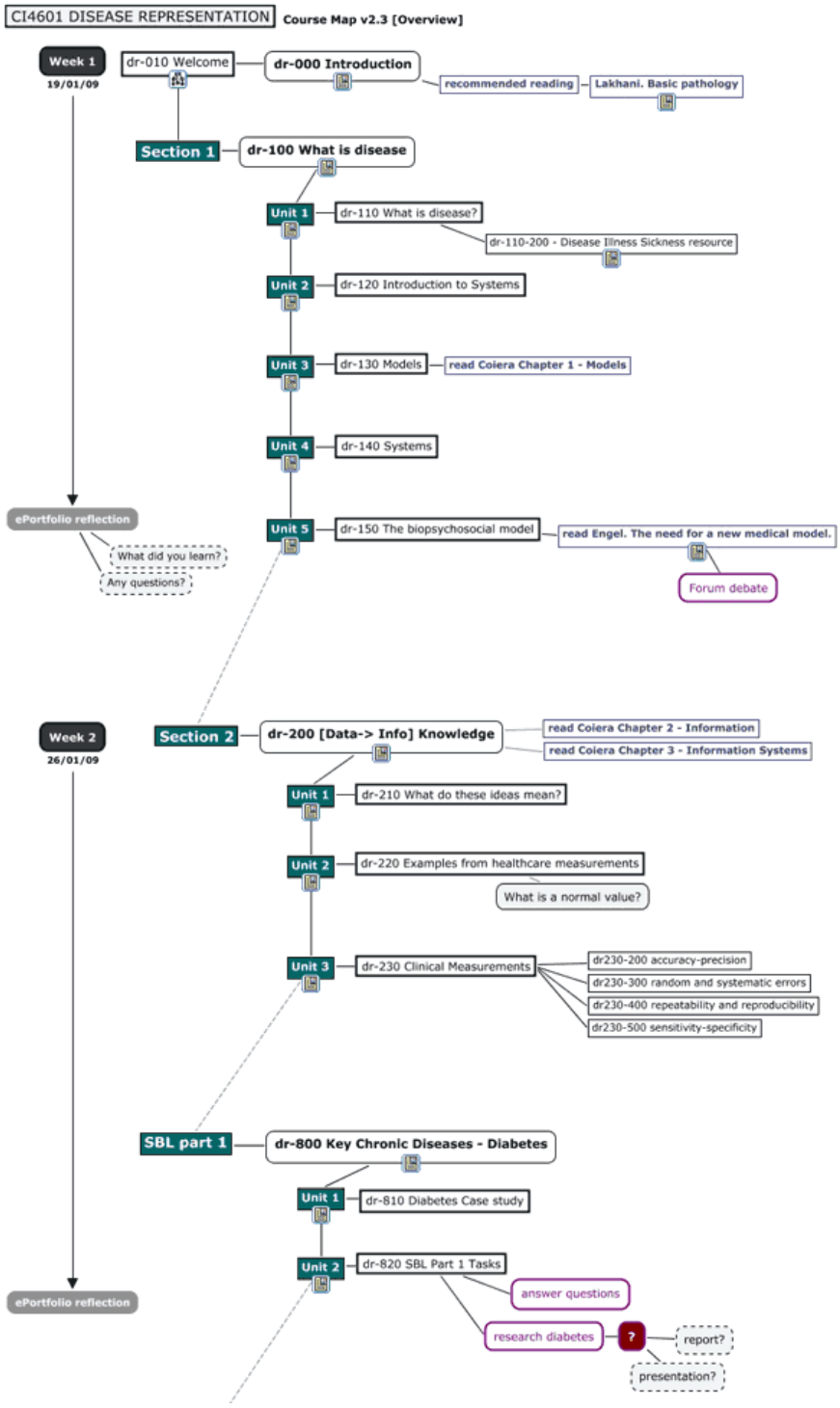
Development Maps come in two types.

Initially, **Curriculum Maps** are created to organise and extrapolate the Subject Matter Expert's teaching materials into an overview of the core concepts and learning objectives for each module.

The mapping process facilitates the task of identifying the units into which each module can be chunked for effective online delivery. Learning episodes become evident from the groupings that can be made of the granular elements that emerge.

The Curriculums Maps are then further refined and reorganised into an educational storyline that is recorded in the form of **Course Maps**. These help plan the overall student journey through the materials by providing the road map for distinct educational scenarios. For example, where conditional branching scenarios are required these can easily be visualised using this mapping methodology.

At their simplest, the Course Maps outline how each unit, or learning object, is to be used as part of clear and cohesive lesson plan. Where conditional branching scenarios are required these can also be visualised using the same mapping methodology.

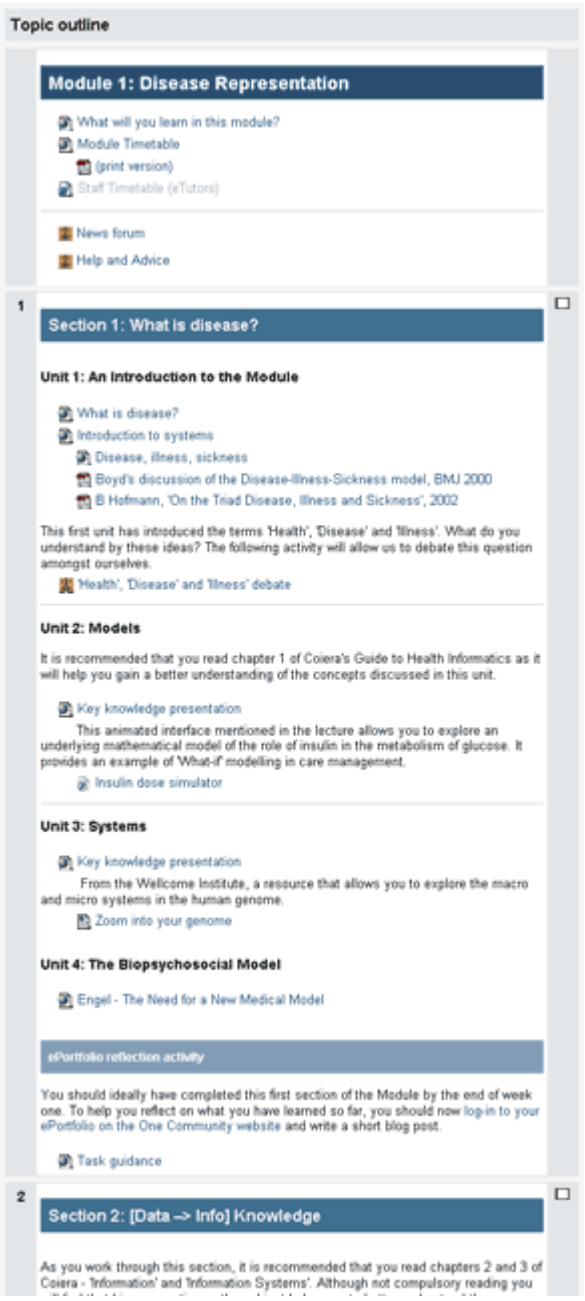


Advantages

Once completed, the educational mapping process provides an unambiguous representation of the curriculum content and a clear blueprint of the materials that need to be built.

I often make curriculum maps available to students in addition to their normal learning materials. Providing them with what are essentially mind maps of their field of study allows them to view the topic in a new way. Many have commented that this has helped them gain valuable new insights and to better understand the subject.

From a development perspective, curriculum maps ensure that any learning objects that are created clearly meet the educational requirements of the curriculum. They also play an important role in project managing the creation of a new course or module.



Course maps become blueprints for the development phase. They provide a structured inventory for resource development that guides content developers once they begin the physical process of producing the required learning materials. They also very often act as the template for the final Moodle course page.

Additionally, since their role is to display how learning units are sequenced to provide meaningful learning episodes, they also function as module timetables; providing an invaluable visual framework that both students and staff can use to keep track of their progress through a course.

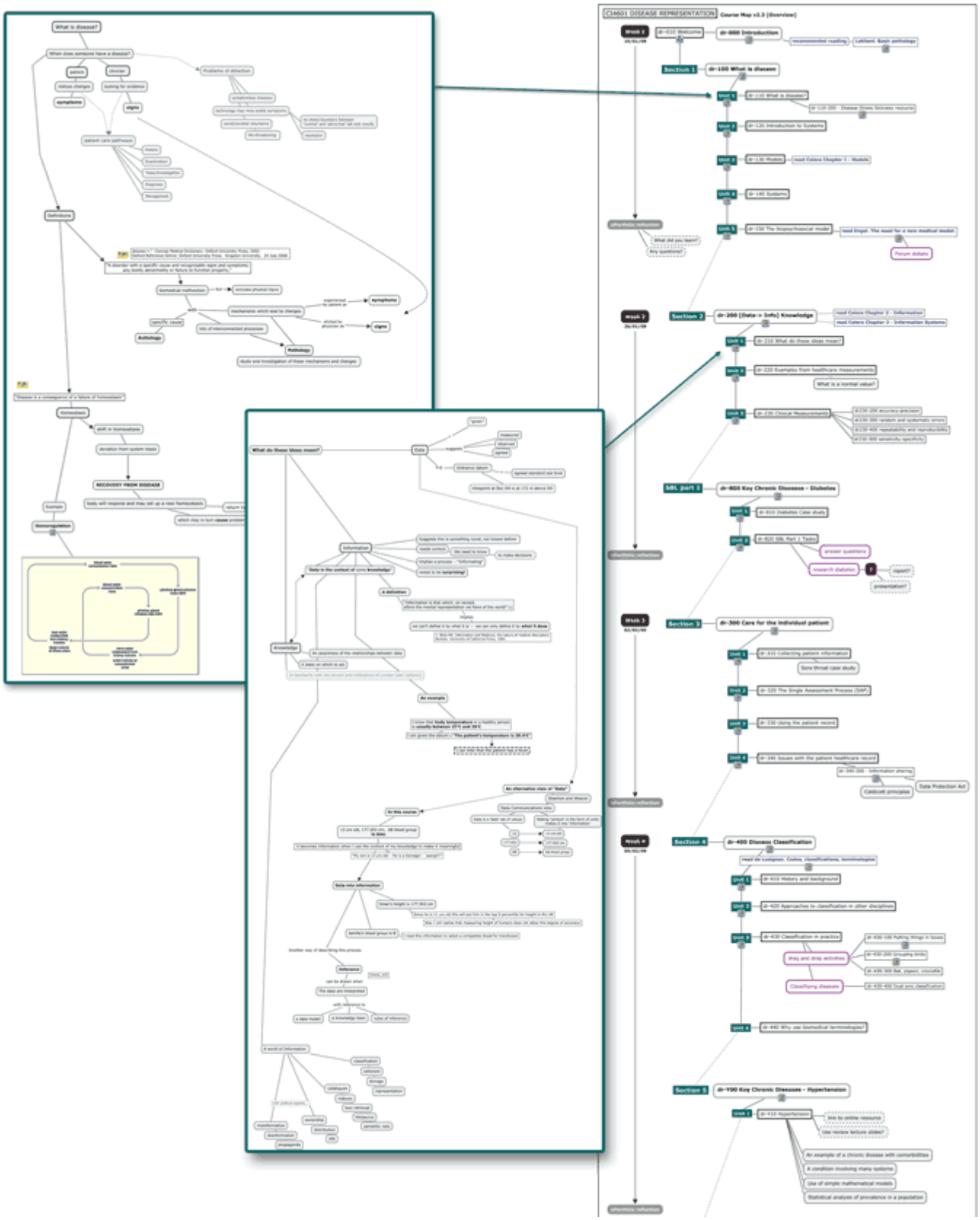
Modularity

Inherent in the mapping and chunking process, is a design strategy based on modular principles. This modularity helps to ensure that courseware can easily be updated to reflect changing curriculum requirements and promotes the re-use of learning units across other modules or courses.

Course maps are not always linear. The modular nature of the units as building blocks also allows conditional paths to be defined through the materials in relation to formative assessments (i.e. if a student can solve a problem then go to unit X, if not go to unit Y). This kind of instructional design makes for much richer online learning and facilitates the repurposing of existing materials into engaging problem-based activities.

Educational mapping process outputs:

- Curriculum maps
- Course maps
- Instructional design strategies
- Blueprint for development



Instructional Design

Initial curriculum and course maps may literally be a brainstorm of disparate ideas. As the vision for a course module develops, course maps are refined by the instructional strategies that best fit the lecturer's teaching style and the subject matter to be taught.

The task is to identify not just what the lecturer teaches but also how they do so. Finding ways to articulate their teaching style ensures that they retain an important sense of ownership. The best online courses have teaching staff that feel comfortable with the materials. If they engage with the course, so will their students.

My role involves suggesting ideas, showing the lecturer examples of previously successful activities, and reassuring them that an online course can be just as rewarding as a face to face one.

Communities of learning

The discussions that students have in lectures or seminars, and amongst themselves in cafes and corridors, is often where the real learning takes place. An effective online course will foster this peer learning community in just the same way as any other course. Using online debates, asking students to comment on, or grade, each other's work, setting-up group tasks, are all strategies that are useful in achieving this.

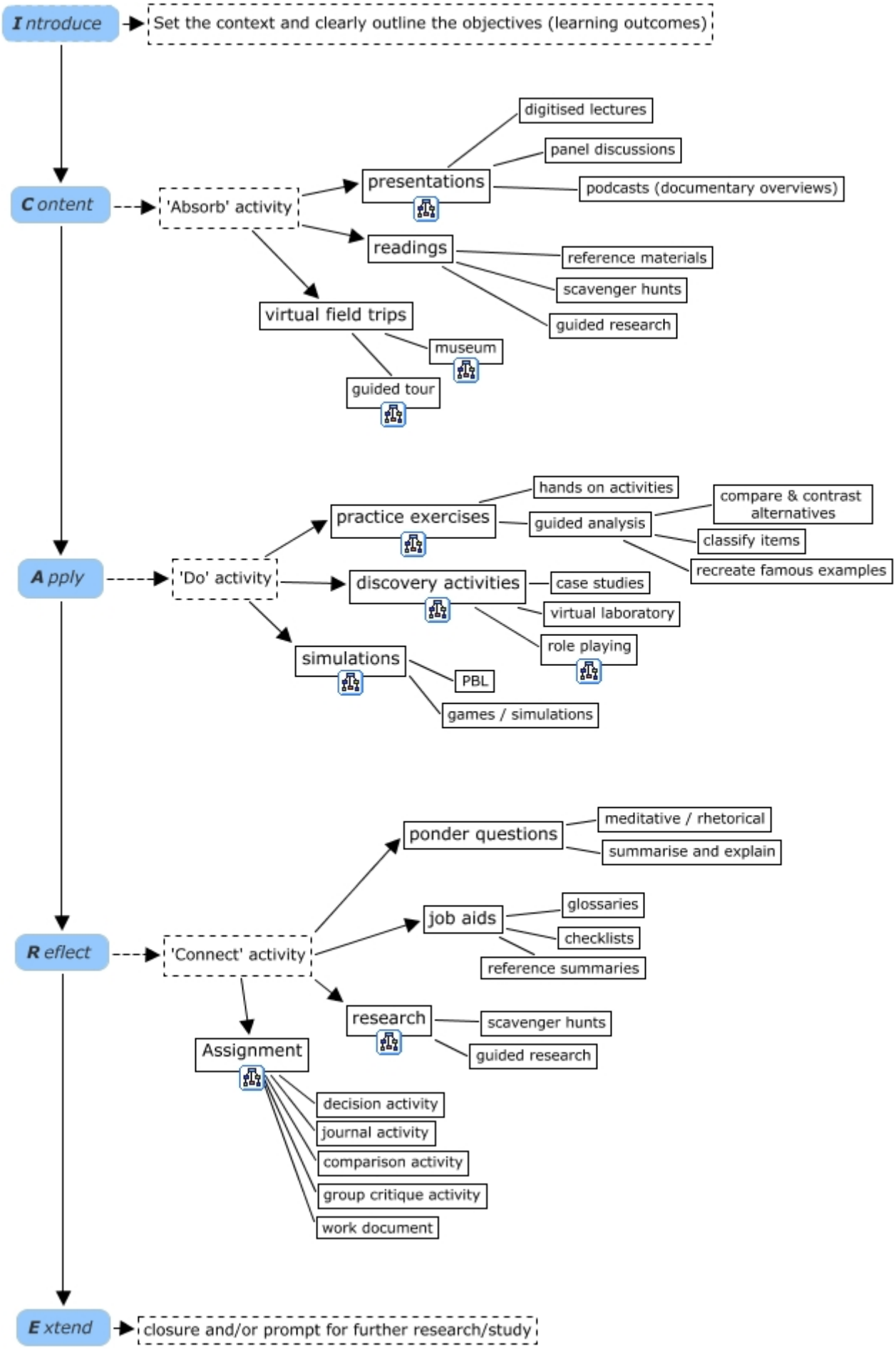
Just in time information

The worst e-learning is often nothing more than a click-through information dump during which a learner is asked to memorise a set of facts or instructions.

By comparison, the best activities are informed by problem-based learning principles that encourage learners to find the information they need, as they need it, and allows them to put into practice what they have learned - ideally within the context of a true to life scenario.

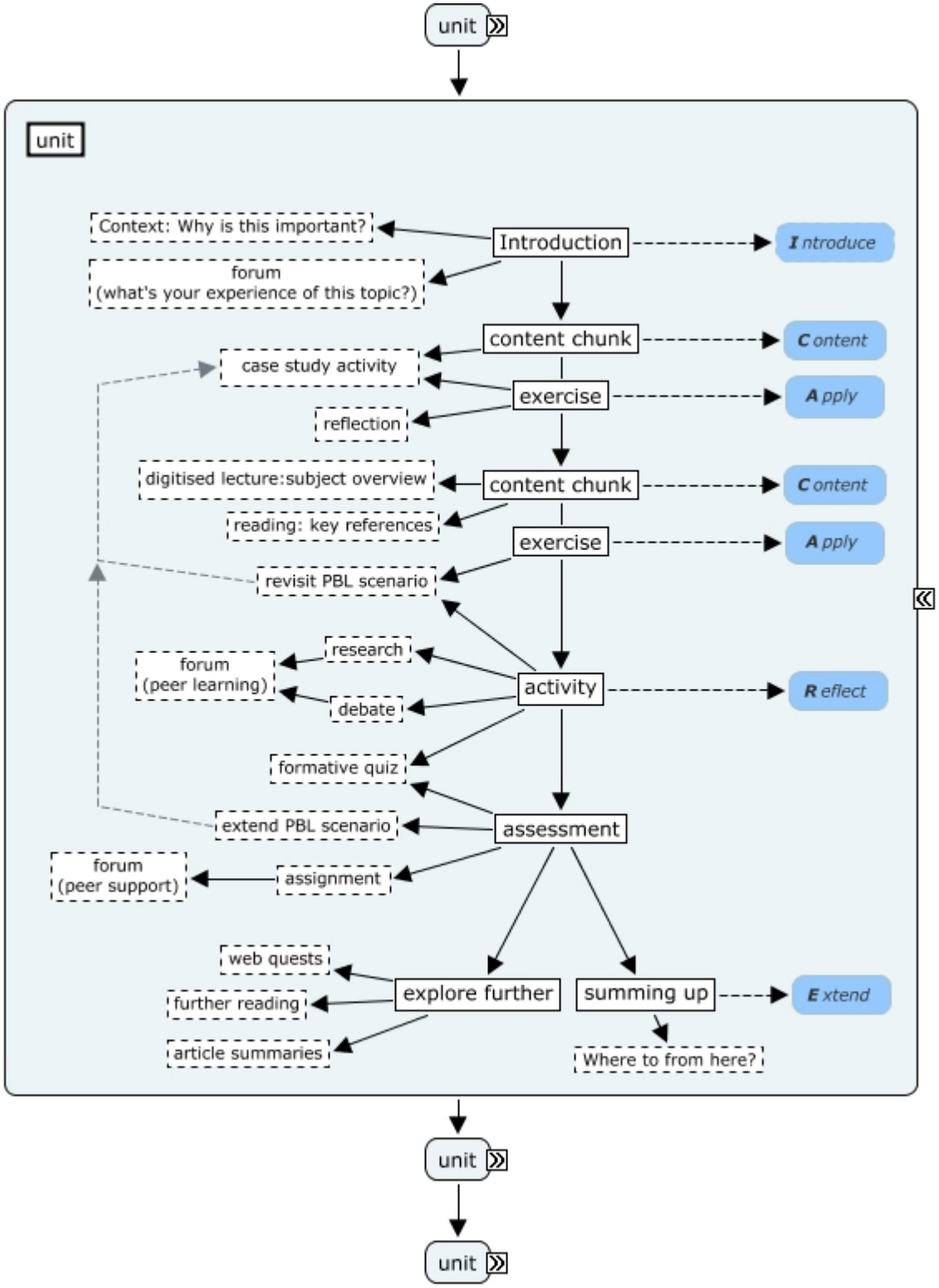
An e-Learning Toolkit

I often use the following toolkit as a way to inspire lecturers to find creative ways of re-authoring existing materials into more interactive and ideally problem-based activities. By mapping different activity types to an instructional model known by the acronym 'iCare' I am able to encourage academics to structure and extend their teaching in ways they may not have previously considered.


Introduce
Set the context and clearly outline the objectives (learning outcomes)
Content
'Absorb' activity
presentations
digitised lectures
panel discussions
podcasts (documentary overviews)
readings
reference materials
scavenger hunts
guided research
virtual field trips
museum
guided tour
Apply
'Do' activity
practice exercises
hands on activities
guided analysis
compare & contrast alternatives
classify items
recreate famous examples
discovery activities
case studies
virtual laboratory
role playing
simulations
PBL
games / simulations
Reflect
'Connect' activity
ponder questions
meditative / rhetorical
summarise and explain
job aids
glossaries
checklists
reference summaries
research
scavenger hunts
guided research
Assignment
decision activity
journal activity
comparison activity
group critique activity
work document
Extend
closure and/or prompt for further research/study

Informed by these principles, each of the units previously defined in the curriculum and course maps can be further tailored to promote active student participation, encouraging them to learn through activity and practice. This model requires learners not just to take on board new information but also to apply this knowledge in ways that makes the subject meaningful and relevant to real-world scenarios.

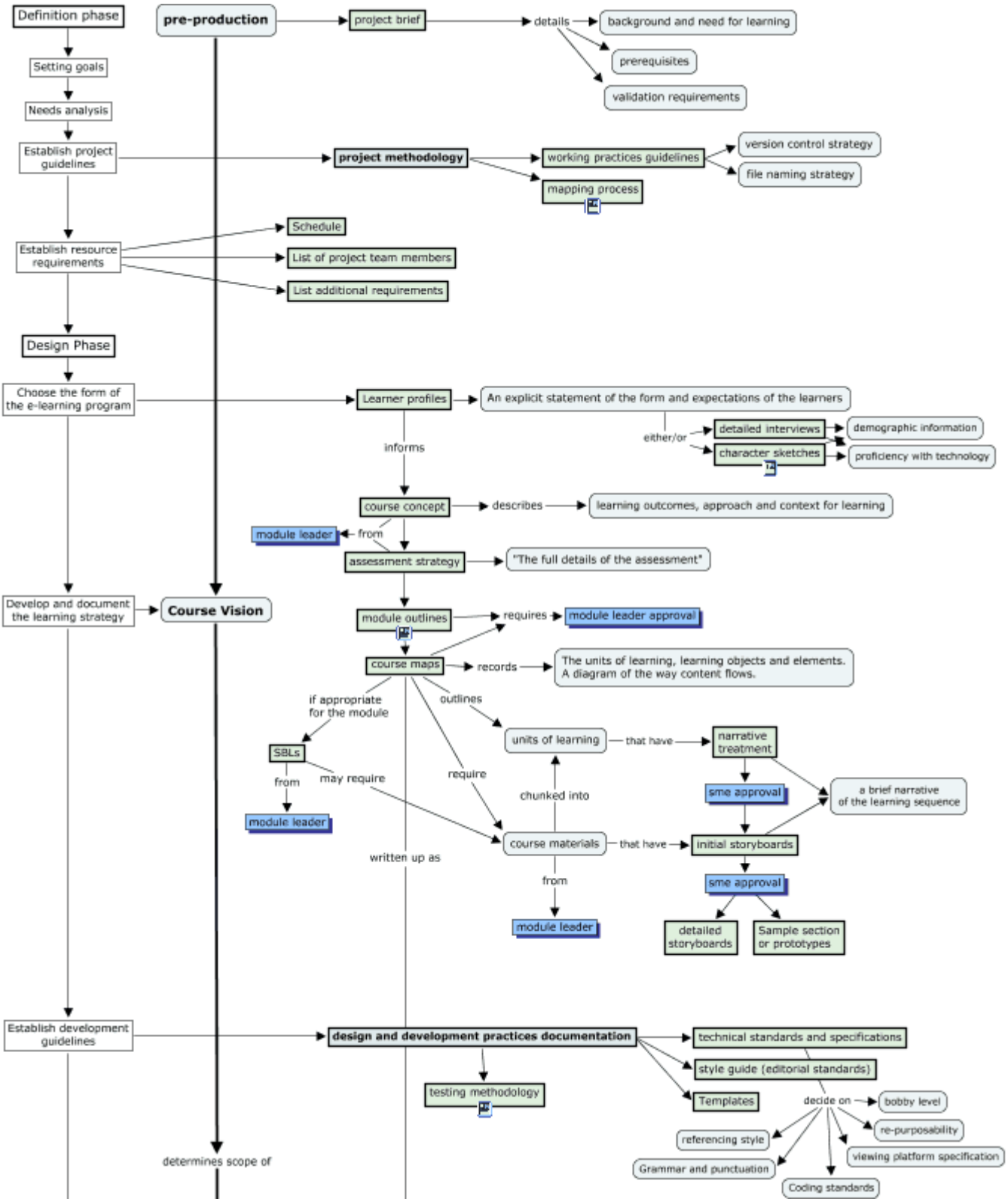
It is important to realise that any instructional design strategy should not limit or hinder the course team's aspiration to create meaningful and effective materials. In practice, a learning unit may use multiple instances of each of the iCare stages, allowing the learner to absorb, use and reflect on information, both building on prior knowledge and preparing them for later units.

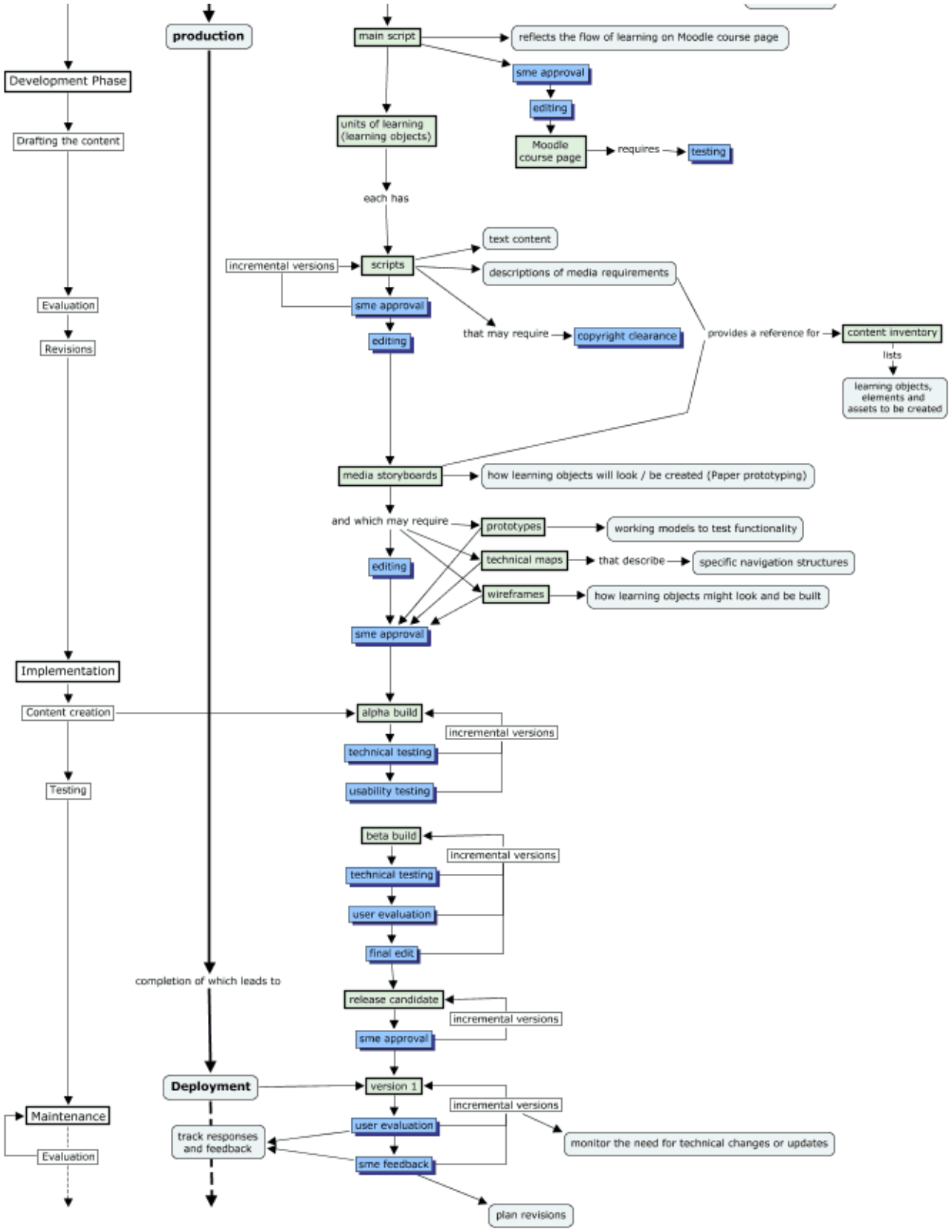


Multimedia Design and Development

Only now, after having carefully considered the structure of each course module and having chunked its content into itemised learning units, do I contemplate the physical realisation of the course materials and begin the multimedia development phase.

Moving from top to bottom, the following workflow diagram illustrates how late in the development process content creation actually comes.





Project Management

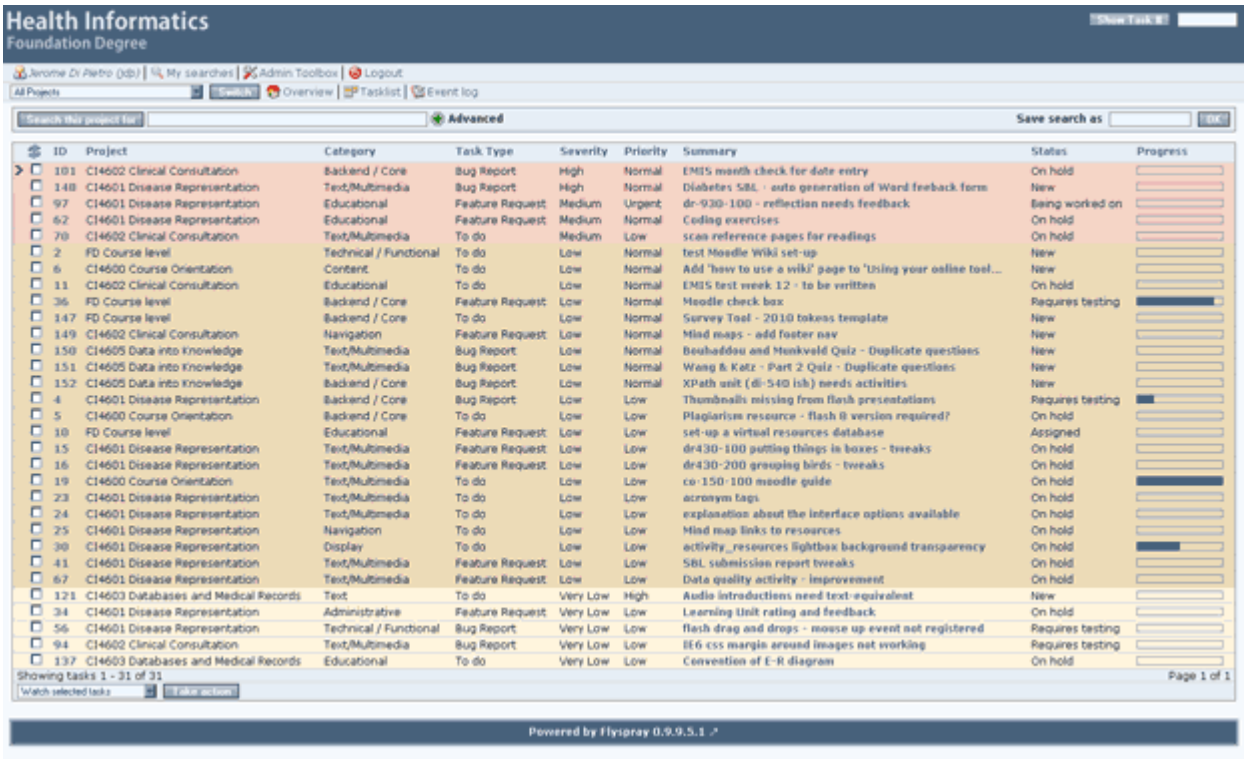
Before going into production, I draft four important documents;

- design guidelines,
- editorial standards,
- technical specifications and
- a user testing methodology.

On projects with medium to large scale teams, this documentation ensures that all stakeholders have a clear understanding of their roles and responsibilities. Clear guidelines promote consistency and ensure that the final materials are appropriate to the intended audience. They detail everything from coding standards and acceptable download times to the standardised use of punctuation and the module leader's choice of referencing style.

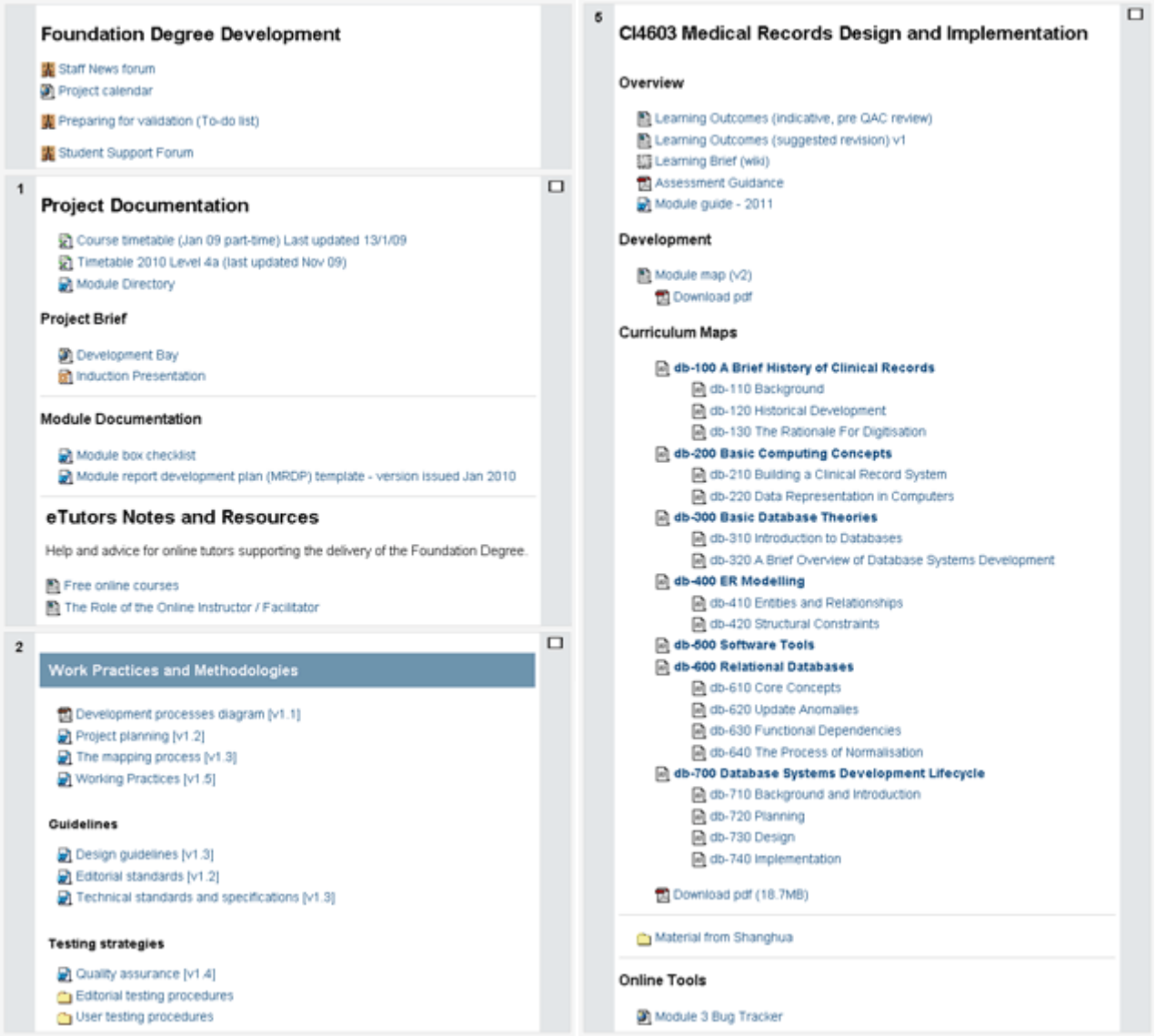
Importantly, these guidelines provide a quality assurance framework against which the finished courseware can be appraised before going live.

I make all of this documentation available online and use forums and a bug-tracking web application to promote communication between the members of the course team. Tasks can be assigned to one or more individuals, prioritised as necessary and audited for project management purposes.



The central repository for project files and discussions is the same VLE as will be used to deliver the course. From experience I have found that this allows lecturers to become accustomed to the system before their course or module begins.

Scripts, storyboards, prototypes and wireframes are all made available to lecturers as early as possible, allowing them to make comments, report bugs and suggest improvements to the developers. Rather than having subject matter experts 'dumping' materials on a learning technologist's desk I strongly encourage a close and continued collaboration between academic and technical staff. This is key to creating materials that are actually fit for purpose.



Multimedia Technologies

When deciding between the choice of tools, technologies and platforms for delivery - whether HTML, Flash, using the VLE's built-in activities or commercial solutions such as Adobe Captivate, a learning technologist's role is to support lecturers to do what they do best - teach - not to showcase their skills as a programmer. There's obviously room for innovation, and a multimedia developer should make recommendations on how a topic might best be presented, but it's crucial to find solutions that actually meet the needs of tutors and learners. Achieving this with the resources available and within the allocated time and budget is where a developer's creativity really shines through.

Rather than sticking with a one size fits all solution, I'm a strong believer that each lecturer's teaching style should inform the style and delivery of the materials. This allows them to feel ownership of their course materials and encourages them to engage with their students while the module is running.

Considerations of uniformity and consistency between modules are important but I also find that creating materials that use different styles and types of delivery keeps students interested and alert.

Most importantly, the topic itself dictates how the materials are best presented. The bottom line is to remain true to the instructional design strategies agreed to during the course mapping process. Form follows function. It may be that a complex software simulation has to be designed and built so that learners can safely explore the boundaries of their knowledge. At other times simply drafting a carefully worded question for a forum debate is all that's required.

I don't believe in technology for technology's sake. As a developer I like to spend my time building elements that actually enrich and benefit a course. Whenever possible why not pass on as much of the work onto your learners? A good example is to resist the temptation of providing direct links to journal articles. Instead, having properly referenced key texts and primary sources, students should be encouraged to find these publications for themselves either online or in a library. This promotes good academic practice and helps them develop research skills applicable to any course of study.

Showcase

Older examples of my work are available from my personal website. There you'll find materials created at the Open Polytechnic of New Zealand for the NZ-OER repository as well as for the JISC funded X4L project and at South Birmingham College.

This showcase focuses on some of my more recent work for the foundation degree in Health Informatics run jointly by Kingston University, St George's University of London and The Royal Holloway.

The Course Page

A well organised course page is key to a successful online course. Here I've created a simple Moodle theme with header buttons that link to other university portals frequently used by our students.

The main course content is neatly laid out, organised in a clear and logical structure. The format remains consistent from module to module, starting with an introduction then listing support forums and assessments. These are then followed by links to resources and activities organised into sections and units as originally outlined during the course mapping process.


Learning Units

Rather than displaying long lists of resource links, I like to package learning units as small groups of web pages. This enables students to work through manageable 'chunks' of content.

Here you'll notice that each 'Key Knowledge Unit' begins with an engaging introduction that does more than just list learning objectives. Its role is to set the scene and to excite the learner's imagination. This may be followed by a presentation, a core text or a video analysis which is followed by one or more activities. Implicitly, the 'iCare' model is used to underpin the type of instruction given; absorb, use and reflect.

Best practice usually dictates that presentations should be no more than 15 minutes in length and learning units should take about 30 minutes to complete. Students on this course are all in full-time employment and tend to work evenings and weekends. Small manageable units make it easier for them to do a little often.

That said, by using a micro-site format for each learning unit I am able to use sidebars and box-outs to present additional resources for students to explore at their own leisure. These days the majority of our learners are web literate and are well versed in this kind of hyper linking. Rather than being distracting, this 'just in time' information provides important support materials and creates an immersive learning environment that encourages academic exploration.

Digitised presentations

Depending on the subject matter, and on the lecturer, presentations can work well with an appropriate voice over. However, research suggests that displaying a video of the presenter's face distracts the audience from the intended content. It should also be noted that these materials are

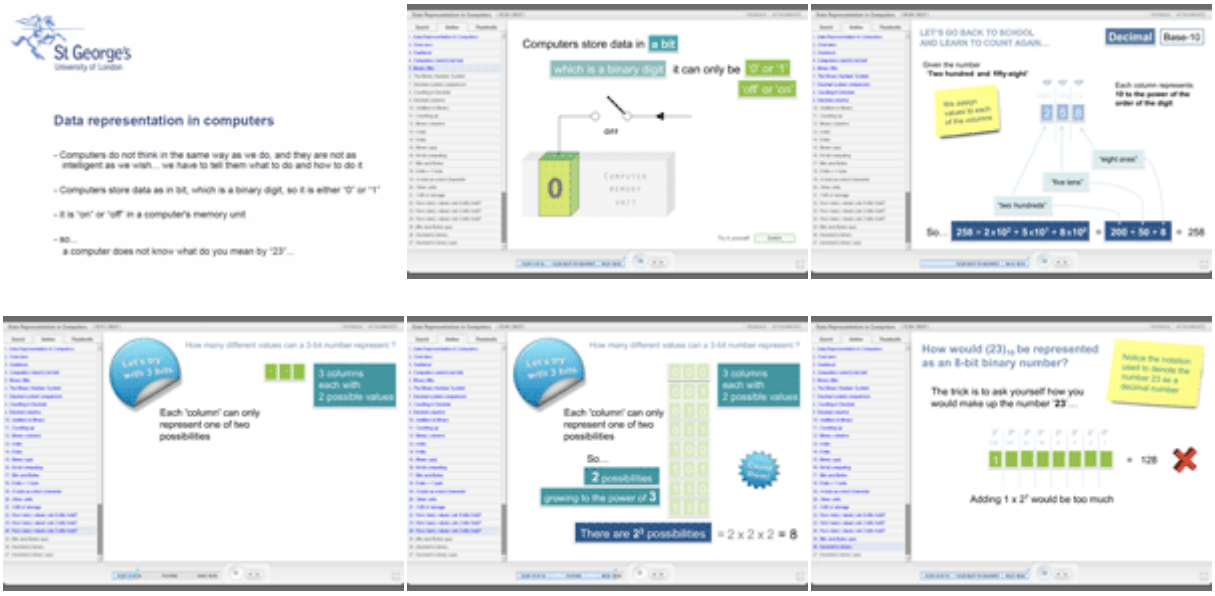
carefully constructed for an online audience - they are not simply recordings of a live lecture. Judicious editing is used to pace the materials, and an appropriate interface is provided allowing learners to pause, rewind and replay sections as required.

The danger of digitised presentations is that they reduce online instruction to a single, unidirectional flow of information. It's far too easy for passive learners to 'zone out' so you'll notice that this learning unit concludes with a set of questions prompting the learner to reflect. These aren't the one dimensional MCQs often found at the end of archetypal e-learning units. For those who take the time to respond, the feedback rewards them with additional information or further questions that hint a new lines of enquiry.

Self-paced online tutorials

Some online 'presentations' require no audio. Materials designed to explain procedural processes benefit from being entirely self-paced and free from a voice-over. Here, what originally started as a lecture on the binary and hexadecimal numbering systems has been expanded into a full online tutorial.

Although they started as PowerPoint presentations given to me by the Module Leader, you'll notice that the final materials are far from the usual bulleted lists of 'important points to note'. I've made every endeavour to redesign the instruction to be as interactive as possible, moving beyond text-based bullet lists and instead using animated walk-throughs and interactions that challenge and engage the learner.



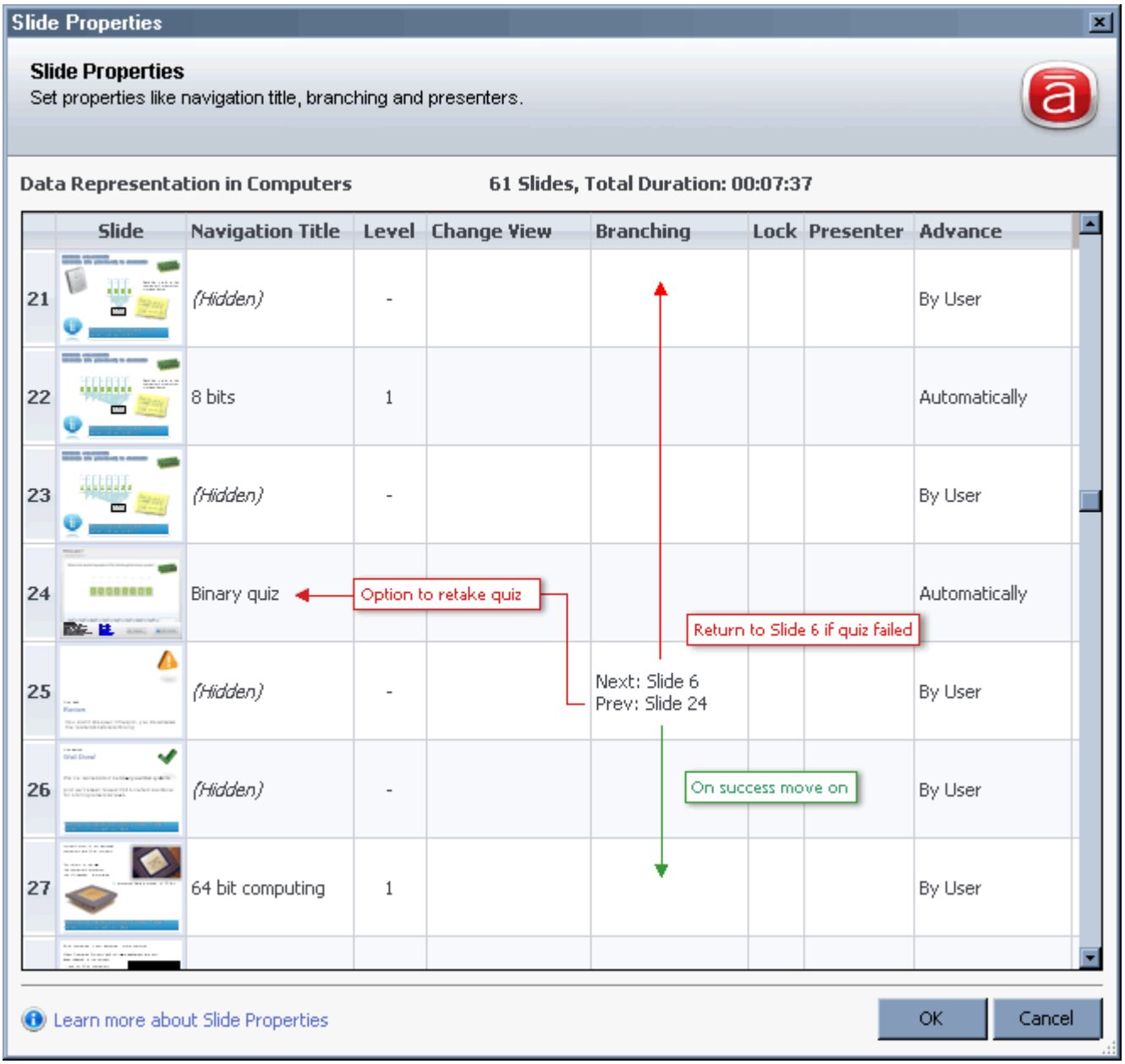
Striking a balance between ‘push’ and ‘pull’ design approaches, explanations are followed by hands-on interactions that allow the learner to try out the concepts discussed. Quizzes are also used to reinforce knowledge acquisition with pass or fail conditional branching ensuring that learners only progress once they've successfully demonstrated that they're ready for the next section.

Using Articulate Presenter

At its simplest, this software simply imports standard PowerPoint slides and prepares them for web delivery. Its real power, however, comes from the fact that conditional paths can be defined through a presentation in relation to in-line quizzes or decisions made (buttons pressed) by the learner.

For example, if a student can solve a problem on slide X then go to slide Y, if not go to slide Z. The ability to create non-linear materials with paths dictated by learner interaction makes for much richer online learning. It allows just the right kind of information to be presented as and when it is needed. Working from existing materials the task of the instructional designer becomes focused on finding creative ways of re-authoring linear materials into multidimensional problem-based activities.

When working from source materials that are mostly PowerPoint presentations, a development tool like Articulate Presenter allows a developer to get away from the kind of fragmented e-learning that first asks learners to click through a set of slides and then to open a separate quiz to test their knowledge. This kind of 'tell and test' method of instruction is unfortunately too common in CBL (Computer-based Learning) circles. Its focus on short-term retention, rather than deep learning, tends to give e-learning a bad reputation. Here a more challenging exploratory framework is used to provide more effective tuition.



Using HTML

Of course these kinds of materials don't have to be authored using Articulate. HTML web pages can be just as effective. They too can include rich in-line activities that encourage the learner to interact and engage with the subject.

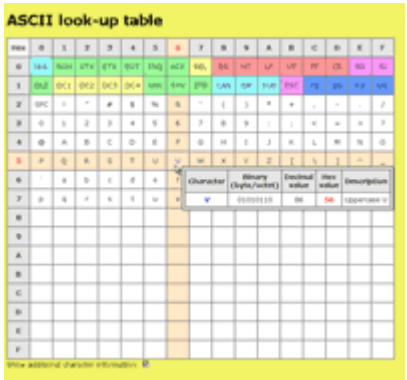
A good example is this text-only version of a case-study also available to students as a multimedia presentation. The plain text approach is a good reminder that not all multimedia materials have to use complex interactions or complex/lengthy/costly development. Here a sensible balance has been struck between style and substance, with most of the development time having been spent on the quality of the content, not just its presentation.

Moving beyond plain text

A simple, yet highly effective technique is to 'hide' some of the content by only making it available as feedback to reflective, formative questions. Although this represents only a basic level of interaction it stops students from falling into the trap of becoming purely passive recipients.

Here the technique is demonstrated as part of a clinical coding exercise. Although many developers might choose to use a Flash resource for this kind of simple quiz, using an HTML-based solution allows for the kind of lengthy, constructive feedback that is far more difficult to provide in a Flash movie.

Flash vs HTML



Developments in the HTML specifications and the use of Javascript libraries such as Prototype and jQuery have recently blurred what used to be perceived as the distinction between rich 'Flash' media and 'plain-old' text-based web content. It is now possible to build rich internet applications with cross-platform, cross-browser support without being tied to Adobe's plug-in technology.

This ASCII look-up table is a simple yet effective example of the kind of Flash-like interaction that is also possible with plain

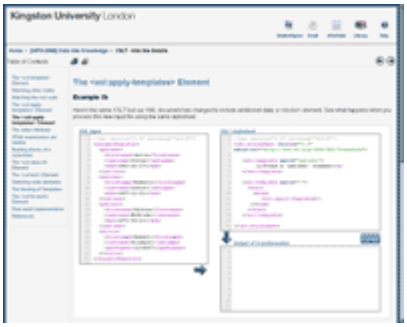
HTML. Flash materials are not readily accessible on assistive technologies such as screen readers, and not at all on Apple's increasingly popular iPhone and iPad hardware. For these reasons it has become more and more important to think about avoiding closed or proprietary plug-ins and technologies. As a solution, HTML5/CSS3 and careful use of JavaScript for progressive enhancements can be leveraged to provide much more accessible yet equally engaging content - all in a format that is available across a full range of handheld devices. Not all institutions have as yet decided to explore the brave new world of m-learning, but students themselves are often ahead of the game, and are beginning to expect mobile versions of their materials.

HTML drag and drop

This simple drag-and-drop activity provides students with a hands-on exploration classification criteria. Again, this kind of interaction could easily be produced in Flash but the HTML version imparts a user experience that feels more native to the browser.

Search functionality

JavaScript can also be used to provide added functionality such as live search filters. Here users are able to use keywords to display only the relevant results from a collection of video consultations. Note the visual design of this resource. In line with my passion for designing educational interfaces from a constructivist perspective, it uses visual context reminiscent of an academic video research lab.



XML coding lab

A yet more complex example of Javascript functionality is this coding lab. Part of an XML teaching resource, it allows learners to try different XSL Transformations directly within the context of their learning materials. This technique is immensely powerful, and compelling, as it allows students to actually try the syntax they're learning about at the same time as reading about it.

Giving learners the ability to try out new skills as they are acquiring them is key to successful instructional design.

Database driven web-applications

Not all e-learning happens at a computer. By leveraging more complex web technologies (PHP/MySQL) I like to create materials that allow students to start an activity, perhaps spend time researching the subject or reflecting on what they have learned and then come back to continue where they left off.

The following case study activity is a good example. It was adapted from a series of SBL seminars held over the period of 12 weeks when delivered as part of a traditional face-to-face course. The

distance learning version allows students to save and review their answers to a number of key questions on the topic of diabetes diagnosis and management. It is rich in formative feedback, using inline text that appears after clicking a 'Check' button. The activity also requires students to make a final submission of their work. The web application automatically send teaching staff a copy of each student's answers and allows them to email back further comments.

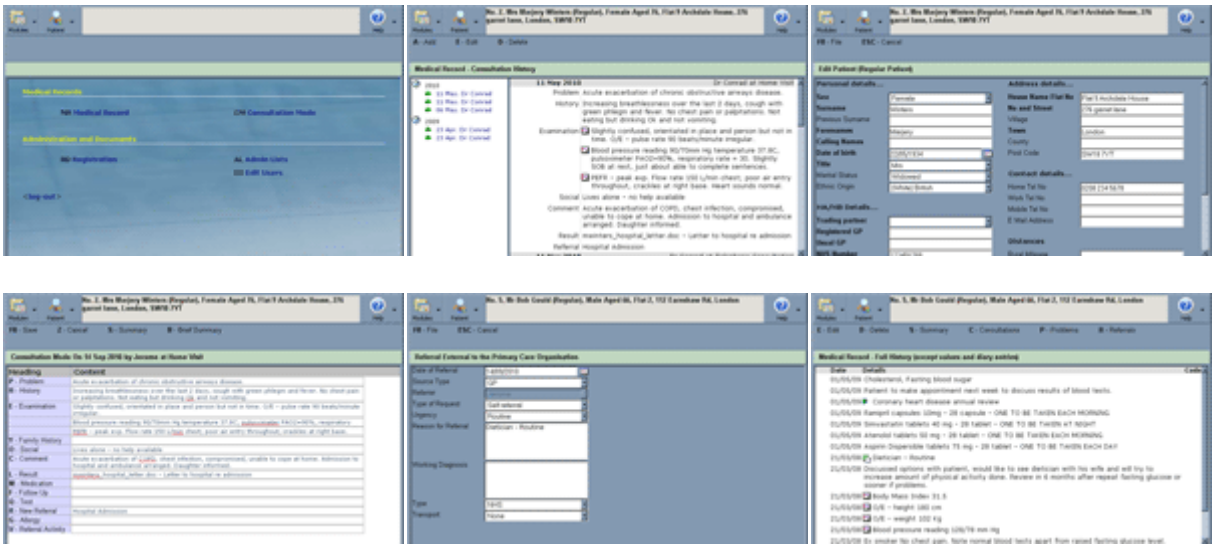
Simulations

Some learning materials require even more complex interactions. Reading, reflection and discussions in online forums work well with more discursive subjects but other topics truly benefit from allowing learner to test their knowledge within a practical setting.

Simulations are ideal for this kind of instruction. They come into their own when teaching skills-based activities such as clinical coding.

EMIS Sim

Here, a software simulations of an Electronic Patient Record System, (authored with PHP/MySQL) is a simplified replica of an existing commercial system. It provides students with a safe environment in which to practice their skills.



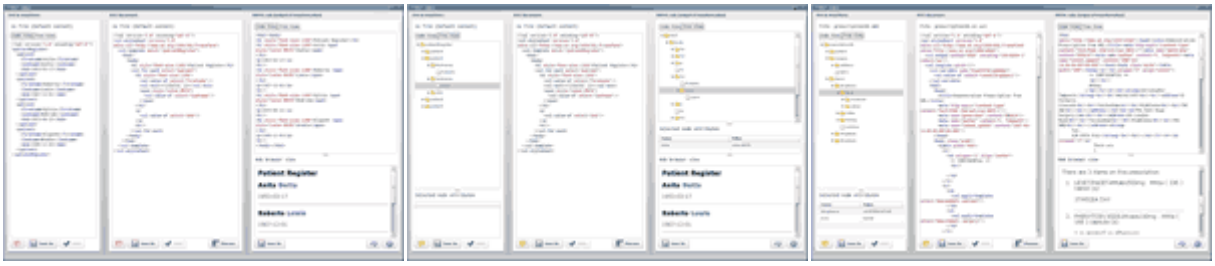
XSLT Editor

Another way to provide students with a sandbox in which to try out new ideas is to build software editors specifically designed to promote testing and innovation.

This XSLT editor displays XML documents both in code view and as folder trees, reinforcing the hierarchical nature of XML data. It includes a live HTML preview of XSL stylesheets together with full save and undo functionality, therefore encouraging experimentation and 'learning by doing'.

Students are initially instructed to load example files from their tutors which they can then alter and export as their own versions. These are shared amongst the cohort so that each student can learn by working on each other's code.

Because of the file level operating system permissions required for this kind of resource, the XSLT Editor was authored in Flex and published as a desktop application running on the Adobe Air runtime. A versioning system that automatically pushes updates to users has been implemented in order to facilitate the roll-out of any new features or bug fixes.



Virtual Tours

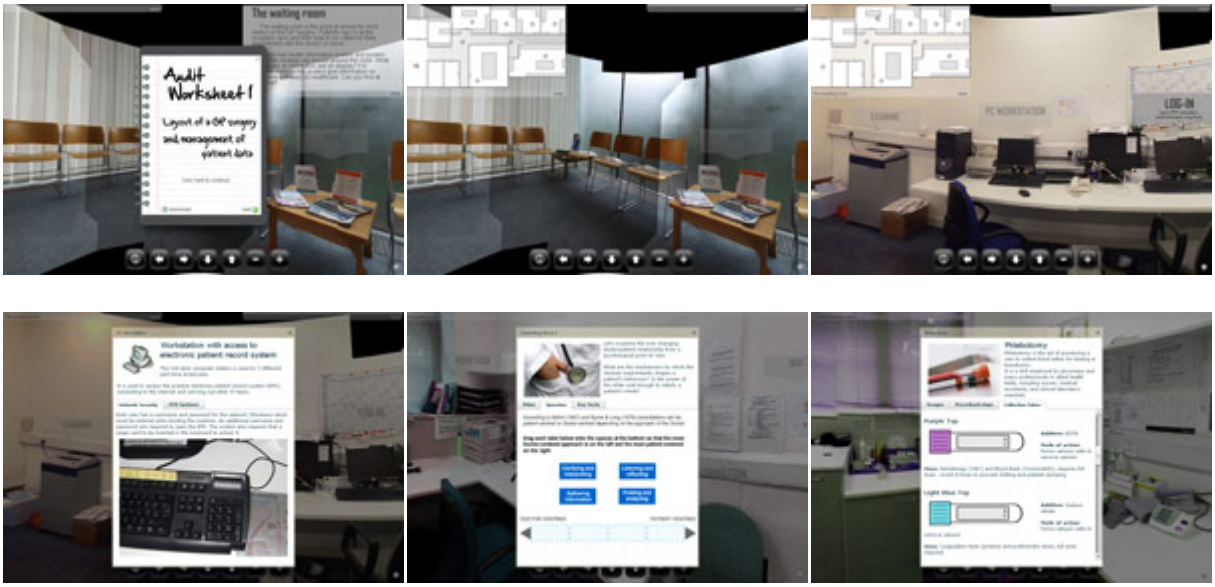
The use of virtual spaces as a way of contextualising student access to learning materials lies at the cutting edge of international developments in the study of learning spaces.

Many educators and institutions have recently been drawn to emerging commercial technologies such as Second Life but very little research has gone into comparing whether fully immersive 3D worlds are actually better than smaller, bespoke interactive environments. Which is more cost effective? Does the technology used have an impact on pedagogy?

The Virtual Clinic project consisted of a comprehensive evaluation of the most effective visual representation for a GP surgery. Three key technological platforms, or strategies, for the building of a web-based virtual space were identified. Prototypes were developed and an extensive user testing evaluation was undertaken.

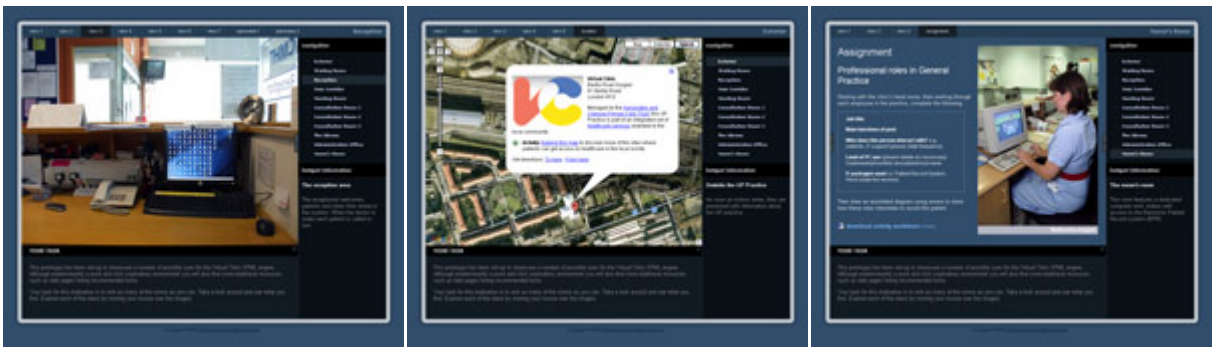
Flash Panorama

Leveraging the impact of photo realistic scenes, this prototype uses panoramic images that are rendered to provide the illusion of a 360° world view. As with QuickTimeVR, hotspots are used to link between multiple panoramas, giving the impression of moving through an immersive environment.



HTML Prototype

Rather than creating a three dimensional environment based on actual 3D geometry, suitable graphics and other multimedia resources can be hyperlinked providing the illusion of a world for the user to explore. Although not truly multi-dimensional this simple approach provides an interactive environment which is often used in online Problem Based Learning activities or Role Play simulations.



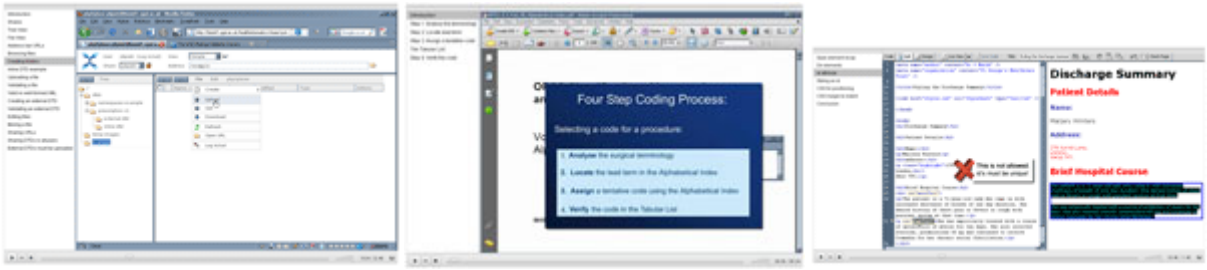
Isometric Prototype

Inspired by 3D chat room websites such as Habbo and the re-emergence of web-friendly pixel-art design, the use of an isometric visualisation benefits from the advantage of small file sizes and programmatic simplicity. Based on what are essentially 2 dimensional grids skewed into orthogonal

perspective, environments can easily be defined from maps created using a two dimensional array of tiles (or map cells).

Screencasts

For practical topics like coding or learning to use software systems, I am increasingly using Camtasia to record screencasts of demonstrations, usually walking through a process and then encouraging students to try it for themselves:



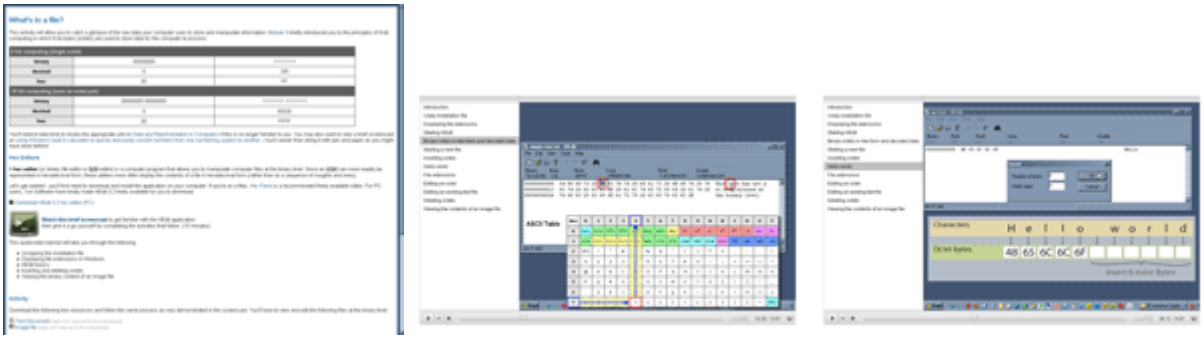
Crucially, these video resources are presented as part of a complete unit of instruction that includes clear steps for the learner to follow, often working from files provided to help them get started. Students are usually required to upload their work in progress and are encouraged to discuss any difficulties they encounter in the online forums.

Guided instruction

Using screencasts supported by online discussions to provide 'show-and-do' practical activities, it is possible to recreate the dynamics that might usually occur in a classroom seminar. The following examples illustrate how this kind of structured instruction can be used to guide learners through relatively complex topics:

Hex Editing unit

A first page providing clear task guidance initially outlines the activity. Exercise files are available for download so that students can quickly get started with the activity.



Word Styles unit

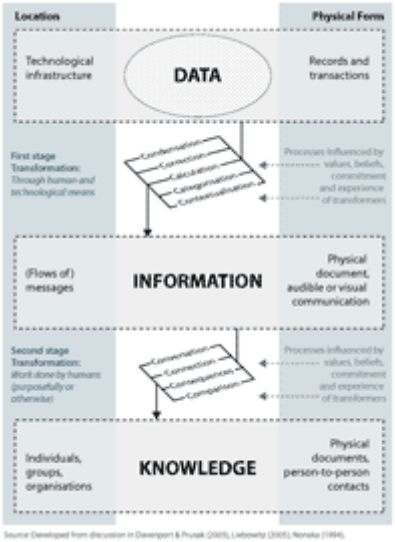
This unit provides a text-only explanation which is supplemented by a video tutorial.

LaTex unit

Here a screencast is first used to walk the students through the installation of a program. The unit then provides guidance and context and a final video demonstrates the exercise.

Graphics

Not all resources have to resort to bandwidth intensive audio and video or necessarily involve complex multimedia development and a lot of coding. Sometimes simple diagrams are the most eloquent way of explaining a concept.



A beneficial by-product of the curriculum mapping process is that these graphical overviews of each module can be provided to the students as mind maps. This allows them to think about the subject from new perspectives and to better appreciate linkages and recurring themes in their field of study.

Forums

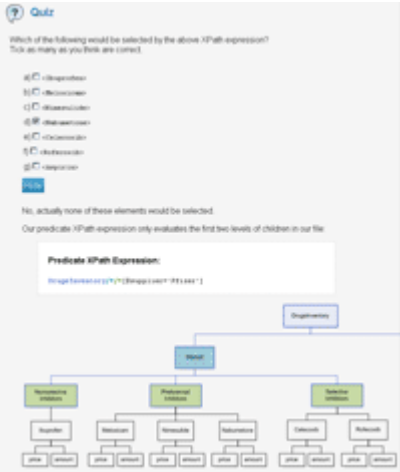
Last but by no means least are discussion forums. This is often where the core part of the learning takes place for online learners. Forum activities can vary from debates that encourage participants to discuss relevant topics (ideally mediated by eTutors) to posts where students upload examples of their work and discuss any problems they have encountered.

More traditional materials are really only the starting point and it is often in these forums that students have their light bulb moment. Only by applying their new found knowledge, asking questions and replying to each other's queries do students really attain full comprehension of a subject.

Forums vs. Quizzes

During practical project-based activities learners can use forums to upload samples of their work in progress. This allows eTutors to provide feedback and guidance, letting them know what's working, what's not, and how they might improve. You simply can't provide this kind of support in the type of 'click-through' MCQs that most people associate with e-learning.

Formative assessments are important to studying online. In the absence of direct and immediate classroom feedback, they provide learners with a sense of achievement and allows them to gage their progress. My recommendation is simply to resist the temptation of automatically resorting to one dimensional MCQs or fill-in-the-blanks exercises.



Writing effective quizzes and other formative assessments can often be more time consuming than multimedia development. That's the way it should be. The fundamental task, whether authoring automated quiz interactions, or writing task guidance notes for forum mediators, is to provide feedback that is rich and meaningful.

The key is to provide the kind of tuition that a skilled educator would offer in a face to face setting; supportive, encouraging and above all empowering students to learn for themselves.